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Chapter 4 Security Valuation

1 Valuation Based holding period of One Year

For all the Formula's Below: Use $D_1 = D_0 + \text{Growth}$

$$P_0 = \frac{D_1}{(1+K_e)^1} + \frac{P_1}{(1+K_e)^1}$$

OR

$$P_0 = \frac{D_1 + P_1}{(1+K_e)^1}$$

Where,
D_0 = Current dividend / Last year paid
D_1 = Expected dividend to be paid next year/ dividend in future
K_e = Cost of Equity / Expected return on Equity Shareholder
P_1 = Expected share price after 1 year
P_0 = Today's share price

2 Zero Growth

$$P_0 = \frac{D}{K_e}$$

3 Constant Growth

$$P_0 = \frac{D_1}{K_e - g} \qquad D_1 = d_0\ (1 + g\ \%)$$

4 Initial Years

$$P_0 = \frac{D_1}{(1+Ke)^1} + \frac{D_2}{(1+Ke)^2} + \ldots + \frac{D_n}{(1+Ke)^n}$$

5 Later Years

$$P_0 = \frac{D_n\ (1+g_n)}{(K_e - g_n)} \times \frac{1}{(1+K_e)^n}$$

6 Three Stage Dividend Discount Model

$$P_0 = \frac{D_0\ (1+g_n)}{r - g_n} + \frac{D_0\ H_1\ (g_c + g_n)}{r - g_n}$$

7 Gordon's Model

$$P_0 = \frac{EPS_1\ (1-b)}{K_e - br}$$

8 Walter's Model

$$P_0 = \frac{D + (E - D) \times \frac{r}{K_e}}{K_e}$$

9 P / E Ratio or Multiplier Approach

MPS = P / E Ratio x EPS

$$EPS = \frac{\text{Profit after tax - preference dividend}}{\text{No. of Equity Shares}}$$

10 Dividend Growth Model

Perpetual Growth Model Formula: $P_0 = \frac{\text{Dividend}}{(K_e - g)}$

11 Ex – Rights Price / Theoretical Ex Rights Price

$$\text{Ex - Rights Price} = \left[\frac{(P_0 \times Ns) + (Nr \times r)}{Ns + Nr}\right]$$

OR $\quad \text{Ex - Rights Price} = [P_0 - V_X]$

12 Value of Right

VX = [Cum - Rights Price - Ex - Rights Price]

(Price of Shares Before rights) - (Price of shares after rights issue)

$\therefore$ Value of Right (Vx) = P_0 - Ex-rights Price

OR $[V_X = P_0 - \text{Ex Rights Price}]$

In totality Value of right : Ex-right Price - r

Value of right per share : P0 - Ex-right price

$$\frac{\text{Ex right price - r}}{\text{No. of original shares for 1 right share}}$$

13 Conversion Premium (%)

$$\frac{\text{MPS of Preference Shares - Conversion Value}}{\text{Conversion Value}}$$

14 Redeemable Preference Shares

$$\left[\frac{\text{Div}_1}{(1+r)^1} + \frac{\text{Div}_2}{(1+r)^2} + \frac{\text{Div}_n + \text{Maturity Value}}{(1+r)^n}\right]$$

15 Irredeemable Preference Shares

$$\frac{\text{Dividend}}{\text{Required return on Preference Share}}$$

16 Value of Bond

= [PV of Interest + PV of Redemption price]

P_0 = Coupon × PViFA + Redemption Value × PViF

$(x\ \%, t)$ $(x\ \%, t)$

17 Calculation of Yield to Maturity

$$YTM = \frac{\text{Coupon} + \left[\frac{RV - cmp}{t}\right]}{\left[\frac{RV + cmp}{2}\right]} \times 100$$

18 ZCB : Zero Coupon Bond

Interest/Coupon Redemption Value - Issue Price

$$V_0(ZCB) = \frac{FV}{(1+K_d)^n}$$

Irredeemable Bonds:

$$V_0 = \frac{\text{Interest}}{K_d}$$

19 Convertible Debentures

Straight Value

P0 = C x PVIFA (x %, t) + RV x PVIF (x %, t)

Conversion Value

Conversion Ratio x CMP of stock/ Equity

Option Value / Premium Over Straight Value

Current market price of bond - Straight Value

Conversion Parity Price

$$\frac{\text{CMP of bond}}{\text{Conversion Ratio}}$$

Floor Value (Downside risk of bond)

$$\text{Downside Risk} = \frac{\text{Straight Value - CMP of bond}}{\text{CMP of bond}} \times 100$$

Conversion Premium (%)

$$\frac{\text{Conversion Premium}}{\text{CMP of Equity}} \times 100$$

Favourable Income Difference per share

$$= \frac{\text{Coupon - [Conversion Ratio} \times \text{DPS]}}{\text{Conversion Ratio}}$$

Premium Payback Period

$$\frac{\text{Conversion Premium}}{\text{Favourable Income Difference / Shares}}$$

20 Bond Refunding

One time Cash Inflow

Tax benefit on write off of issue Exp/ discount on old bonds xxx

A $\left(\frac{\text{Discount of Issue of old Bond} \times \text{No. of Bonds}}{\text{Total duration of old Bond}}\right) \times \text{No. of Years remaining of old Bond} \times \text{Tax Rate \%}$

(Saving Tax on immediate redemption)

B $\left(\frac{\text{Floatation cost of old Bond}}{\text{Total duration of old Bond}}\right) \times \text{No. of Years remaining of old Bond} \times \text{Tax Rate \%}$

(Saving Tax on immediate redemption)

One time Cash Outflow

A Call Premium xxx

$$\left[\text{Call Premium}\left(\frac{\text{Extra Repayment on account of Bond calling} \times \text{No. of Bonds}}{}\right)\right] \times (1 - t)$$

B Over-lapping interest

$$\left[\left(\text{Total Face Value of old Bonds} \times \text{Coupon on old Bonds}\right) \times \frac{\text{Overlapping Months}}{12}\right] \times (1 - t)$$

C New Bond Floatation Cost

Annual Cash Inflow

A. Saving of Interest Expenses x (1 - t) xxx

[(Old Interest Rate - New Interest Rate) x Principal Amount]

B. Tax Benefit on floatation cost of new Bond

$$\frac{(\text{Floatation cost} \times \text{Tax Rate})}{\text{No. of Years Remaining}}$$

Annual Cash Outflow

A. Loss of Tax Benefit on Floatation Cost on amortisation of old Bond xxx

$$\left(\frac{\text{Floatation cost of old Bond}}{\text{Total Duration of old Bond}}\right) \times \text{Tax Rate}$$

B. Loss of Tax Benefit on Amortization of discount on old Bond

$$\left(\frac{\text{Discount on issue of old Bond x No. of Bonds}}{\text{Total Duration of old Bond}}\right) \times \text{Tax Rate}$$

21 Bond Duration (Macaulay Duration)

$$\sum [\text{Time} \times \text{P.V. of Weights}]$$

$$\sum \left[\text{Years } (1, 2, 3, ..., n) \; \frac{[\text{Cashflow (Coupon)} \times \text{Discount factor of respective year}]}{\text{Total of Present Value of Cash Inflows}} \right]$$

22 Modified Duration (Volatility)

$$\frac{\text{Macaulay Duration}}{1 + \text{YTM}}$$

23 Modified Duration (Volatility)

$$\frac{\text{Macaulay Duration}}{1 + \text{YTM}}$$

24 Convexity of Bond

Convexity of Bond (%) = $C^* (\triangle Y)^2 \times 100$

$$C^* = \frac{V_+ + V_- - 2V_0}{2 \times V_0 \times (\Delta Y)^2}$$

25 Stock Lending Scheme

Stock Lender

1. Lending Fee Received : xxx
   Price of shares in various months (x) Lending Fees %
2. Dividend per Share xxx

$$\text{Gain / Loss} = \frac{\text{No. of Shares}}{\text{Total Gains}}$$

xxx

Stock Borrower

1. Lending Fees Paid xxx
2. Bank Generated Charges xxx

$$\text{Price of shares at Beginning} \times \text{Interest Cost \%} \times \frac{\text{Duration}}{\text{12 Months}}$$

3. Gain/Loss on account of change in price of share xxx / (xxx)

$$\frac{\text{Price of Share at Beginning - Price at End}}{\text{Gain/ Loss / Share} \times \text{No. of Shares}}$$

26 Bond - Forward

$$V_0 \text{ Bond (1 Year)} = \frac{\text{Coupon}}{(1 + r_1)}$$

$$V_0 \text{ Bond (2 Year)} = \frac{\text{Coupon}_1}{(1 + r_1)} + \frac{(\text{Coupon}_2 + \text{Redemption Value})}{(1 + r_1)(1 + r_2)}$$

$$V_0 \underset{(n \text{ Years})}{\text{ Bond}} = \frac{\text{Coupon}_1}{(1 + r_1)} + \frac{(\text{Coupon}_2 + \text{Redemption Value})}{(1 + r_1)(1 + r_2)} + ... + \frac{(\text{Coupon}_n + \text{Redemption Value})}{(1 + r_1)(1 + r_2) ... (1 + r_n)}$$

27 Treasury Bills

$$y = \left[\frac{F - P}{P}\right] \times \frac{365}{P} \times 100$$

28 Certificate of deposit

$$Y = \frac{FV - IP}{IP} \times \frac{12\ Months}{No.\ of\ Markets} \times 100$$

29 Commercial Bills

Discount	Effective discount rate
$D = FV \times \frac{Discount\ Rate}{100} \times \frac{No.\ of\ Months}{12}$	$EDR = \frac{FV - SV}{SV} \times \frac{12\ Months}{Duration\ of\ Discount} \times 100$

30 General Formulas to Calculate Value of Equity Shares

Interest Coverage Ratio	$\frac{EBIT}{Interest}$	(Higher the Better)

Fixed Interest/ Dividend Coverage Ratio	
$\frac{PAT + Interest}{Interest + Preference\ Dividend}$	(Higher the Better)

Capital Gearing Ratio	$\frac{Deb + Preference\ Share\ Capital}{Equity\ Share\ Capital + Reserve\ and\ Surplus}$	(Lower the Better)

31 Value of Equity Share using Yield Based Approach

$$Actual\ Yield\ on\ Equity\ Shares\ \% = \frac{Yield\ on\ Shares}{Equity\ Share\ Capital} \times 100$$

(Yield on Shares: as per given in the Question)

$$Value\ of\ Equity\ Share = \frac{Actual\ Yield}{Expected\ Yield} \times Paid\ up\ Value\ of\ Shares$$

Expected Yield:

Normal Return Expected	xxx
(+) Risk Premium	xxx
(For adverse ratio like low interest coverage or high capital gearing ratio)	
Expected Yield %	xxx

32 Net Worth / Book Value / Shareholders Funds / Equity / Net Assets

Share capital + Reserve & Surplus - Preliminary Expenses

GP Ratio	$\frac{\text{Gross Profit}}{\text{Sales}} \times 100$
Debt Equity Ratio	$\frac{\text{Debt}}{\text{Equity}}$
Operating Ratio	$\frac{\text{COGS + Operating Expenses}}{\text{Sales}} \times 100$ OR 100% - Operating Profit
Assets Turnover Ratio	$\frac{\text{Turnover / Sales}}{\text{Assets}} \times 100$
Fixed Assets Turnover Ratio	$\frac{\text{Sales}}{\text{Fixed Assets}} \times 100$
Inventory Turnover Ratio	$\frac{\text{COGS}}{\text{Stock}} \times 100$
Assets to Sales Ratio	$\frac{\text{Assets}}{\text{Sales}} \times 100$
Dividend Payout Ratio	$\frac{\text{Dividend distributed on Equity Shares}}{\text{EATESH}} \times 100$ OR 100% - Retention Ratio
Retention Ratio	$\frac{\text{Retained Earnings}}{\text{EATESH}} \times 100$ OR 100% - Payout Ratio

Dividend Yield	Dividend Per Share (DPS)
$\frac{\text{Dividend distributed on Equity Shares}}{\text{Market Price of Equity Share}} \times 100$	$\frac{\text{Dividend distributed on Equity Shares}}{\text{No. of Equity Share}}$

Earning Per Share (EPS)	$\frac{\text{EAT}}{\text{No. of Equity Shares}}$
Book Value Per Share (BVPS)	$\frac{\text{Book Value / Net Worth}}{\text{No. of Equity Shares}}$

Return on Capital Employed (ROCE) / Return on Investment (ROI)	Return on Equity (ROE)
$\frac{\text{EBIT}}{\text{Capital Employed}} \times 100$	$\frac{\text{EAT}}{\text{Net Worth}} \times 100$ OR $\frac{\text{EPS}}{\text{BVPS}} \times 100$

P/E Ratio	$\frac{\text{MPS}}{\text{EPS}}$

Market Capitalization
MPS × No. of Equity Shares OR P/E Ratio × EAT

$$\text{SGR} = \text{ROE} \times (1 - b) \quad \frac{\text{PAT}}{\text{NW}} \times \left(\frac{1}{\text{Dividend Payout}}\right) \rightarrow \text{(i.e. Retained Earnings)}$$

Chapter 5 Portfolio Management

1 Return

$$\text{Return} = \frac{(P_1 - P_0) + \text{Dividend / Interest / Income}}{P_0} \times 100$$

2 Average / Expected Return (X) (of an Individual Security)

Based on Past (Average Returns)	Based on Future (Expected Returns)
$\bar{A} = \frac{\text{Sum of Past Returns}}{\text{No. of observations}}$	$\bar{A}$ = Sum of Future Return & its individual Probability
$\bar{A} = \frac{\sum A}{n}$	$\bar{A} = \sum (A \times P)$

3 Risk of Individual Security

Based on Past	Based on Future
$\text{Variance } (\sigma^2) = \frac{\sum (A - \bar{A})^2}{n}$	$\text{Variance } (\sigma^2) = \sum \left[(A - \bar{A})^2 \circ P \right]$
$\text{Standard Deviation } (\sigma) = \sqrt{\frac{\sum (A - \bar{A})^2}{n}}$	$\text{Standard Deviation } (\sigma) = \sqrt{\sum \left[(A - \bar{A})^2 \circ P \right]}$

4 Portfolio Risk & Return

Portfolio Return (Expected return on portfolio)	Portfolio Risk
$ER(P) = \begin{bmatrix} (W_A \times \text{Ret.}\ \bar{A}) \\ + (W_B \times \text{Ret.}\ \bar{B}) \\ + \ldots (W_N \times \text{Ret.}\ \bar{N}) \end{bmatrix}$	$\sigma_P = \sqrt{\begin{matrix} (W_A^2 \times \sigma_A^2) \\ + (W_B^2 \times \sigma_B^2) \\ + (2\ COV_{(AB)} \times W_A \times W_B) \end{matrix}}$
$\text{Weight} = \frac{\text{Investement in Individual Securities}}{\text{Total Investments}}$	$COV_{(AB)}$ Represents joint risk between securities in a portfolio
Return = Average $(\bar{A})$ or Expected Return $(\bar{A})$	

5 Covariance Types

Based on Past Data

$$COV_{AB} = \frac{\sum\left[\left(A - \bar{A}\right)\left(B - \bar{B}\right)\right]}{n}$$

Based on Future Data

$$COV_{AB} = \sum\left[\left(A - \bar{A}\right)\left(B - \bar{B}\right) \times P\right]$$

6 Return

$$\text{Return} = \frac{\left(P_1 - P_0\right) + \text{Dividend / Interest / Income}}{P_0} \times 100$$

7 Calculate γ

a) $r_{AB} = \dfrac{COV_{AB}}{\sigma_A \ \sigma_B}$

b) $COV_{AB} = r_{AB} \times \sigma_A \times \sigma_B$

8 Covariance (COV)

$$\frac{\sum\left[\left(A - \bar{A}\right)\left(B - \bar{B}\right)\right]}{n}$$

9 Correlation (r)

$$\gamma_{XY} = \frac{COV_{AB}}{\sigma_A \ \sigma_B}$$

10 Revised Formula of Portfolio Risk Using γ

$$= \sqrt{\left(W_A^2 \times \sigma_A^2\right) + \left(W_B^2 \times \sigma_B^2\right) + \left(2 \times \gamma_{AB} \times \sigma_A \times \sigma_B \times W_A \times W_B\right)}$$

$\gamma_{AB} \times \sigma_A \times \sigma_B = COV_{AB}$

11 Reduction or Dilution of Portfolio Risk through Diversification

Perfectly Positively Correlated (γ= +1)

$$\sigma = \left[W_A \times \sigma_A + W_B \times \sigma_B\right]$$

Perfectly Negatively Correlated (γ= -1)

$$\sigma = \left[W_A \ \sigma_A - W_B \ \sigma_B\right]$$

Zero Correlation (γ= 0)

$$\sigma = \sqrt{W_A^2 \ \sigma_A^2 + W_B^2 \ \sigma_B^2}$$

12 Portfolio more than 2 securities

For 3 Securities:

$$\sigma_P = \sqrt{Wa^2 . \sigma^2 a + Wb^2 . \sigma^2 b + Wc^2 . \sigma^2 c + 2 . Wa . Wb . Cov_{ab} + 2 . Wb . Wc . Cov_{bc} + 2 . Wa . Wc . Cov_{ac}}$$

13 Minimum Variance Portfolio

$$MVP = Wt\ (Sec.\ A) = \frac{\sigma_b^2 - COV_{ab}}{\sigma^2 a + \sigma^2 b - 2\ COV_{ab}}$$

14 Coefficient of Variation (CV)

$$= \frac{\text{Risk}}{\text{Return}} = \frac{\text{Standard Deviation}}{\text{Mean}}$$

15 Capital Asset Pricing Model (CAPM)

$$Ke / RRR / E(r) = Rf + \beta \times (Rm - Rf)$$

16 Calculate Beta

$$\beta eta = \frac{\text{Change in Security Return}}{\text{Change in Market Return}}$$

17 βeta (Represent Joint risk between Securities & Market)

$$\frac{\text{COV (Security, Market)}}{\text{Var (Market)}}$$

$$\frac{\sum\left[(\text{Security} - \overline{\text{Security}})\,(\text{Market} - \overline{\text{Market}})\right]}{\sum(\text{Market} - \overline{\text{Market}})^2}$$

$$\gamma_{ab} = \frac{COV_{ab}}{\sigma_a\ \sigma_b}$$

$$\beta = \frac{\text{COV (S, M)}}{\text{Var (Market)}\ \sigma_m^2}$$

$$\beta = \frac{\gamma_{SM} \times \sigma_S \times \sigma_M}{\sigma^2_M}$$

$$\beta\ (\text{Regression Analysis}) = \beta\ \frac{\sum XY - n\,\bar{X}\,\bar{Y}}{\sum X^2 - n\,(\bar{X})^2}$$

$$\beta_{(P)}\ (\text{Portfolio } \beta\text{eta}) \quad \left[W_A \cdot \beta_A + W_B \cdot \beta_B + ... + W_N \cdot \beta_N\right]$$

$$W_A = \frac{\text{Market Value of Investment in Assets}}{\text{Market Value of the Portfolio}}$$

18 Sharpe Index Model

$$Y = a + bx$$

Y = Return of Security (dependent factor) — a = Intercept (α) (Risk free rate)

b = Slope (Beta) of security — x = Independent factor (Return of Market)

$$(\bar{\varepsilon i}) \quad \text{i.e.} \quad RR = \left[Rf + \beta\ (Rm - Rf)\right] + \bar{\varepsilon i}$$

Total Risk = Systematic Risk + Unsystematic Risk

$$\text{Individual Level} = (\beta^2_s \times \sigma^2_M) + (\sigma ei^2) \quad \text{Error} \quad \text{(will be given)}$$

σ^2_{ei} = Standard Error, Residual Variance

$$\left[USR = TR - SR\right] \left[USR = \sigma^2_S - \beta^2_S \times \sigma^2_M\right]$$

$$\text{Portfolio Level} = (\beta^2_P \times \sigma^2_m) + \left(W^2_A \times USR_A + W^2_B \times USR_B \ldots W^2_n \times USR_n\right)$$

19 Coefficient of Determination (r^2 sm)

$$(\gamma 2)\ (\text{Correlation between Sec \& Market})^2 = \frac{\text{Systematic Risk}}{\text{Total Risk}}$$

20 Arbitrage Pricing Theory / Multifactor Model (APT Model)

$$E(r) = Rf + \beta_1 \times Rp_1 + \beta_2 \times Rp_2 + \beta_3 \times Rp_3 + ... \beta_n \times Rp_n$$

Rp = AR - E(r)

21 Performance Evaluation

Sharpe Ratio	Treynor Ratio	Jensen's Alpha
$= \frac{R_P - Rf}{\sigma_P}$	$= \frac{R_P - Rf}{\beta_P}$	= A (r) - E (r)

22 Market Lines

Characteristic Line	Security Market Line
$RS = RS + \beta \times Rm$	RR = Rf + β × Market Risk Premium

23 To Increase / Decrease Beta

$$\text{Target Beta} = \beta_{(Rf)} \times W_{(Rf)} + \beta_{(\text{Current Portfolio})} + W_{(\text{Current Portfolio})}$$

24 Sharpe Optimal Portfolio

Step 1	Calculation excess return over Beta ratio (similar to Treynor ratio)	$\text{Excess Return over Beta} = \frac{\text{Expected Return - Rf}}{\beta}$
Step 2	Rank Step 1 from highest to lowest	

Step 3

Calculation of optimum cut off point:(highest)

σ^2_m = Variance of Market Index

σ^2_{ei} = Variance of Stock movement not associated with market index

$$C_i = \left[\frac{\sigma^2_m \sum \left(\frac{ER - Rf}{\sigma^2 ei} \right) \beta i}{1 + \left(\sigma^2_m \times \sum \frac{\beta i^2}{\sigma ei^2} \right)} \right]$$

Step 4	Compute the cut off point with the highest value of Ci & Taken as C*

Step 5

Calculation of weights of securities selected in step 4

$$Wi\ (WA) = \frac{Zi}{\Sigma Z} \qquad Zi = \frac{\beta}{\sigma^2 ei} \times \left[\frac{ER - Rf}{\beta} - C^* \right] \qquad WA = 1 - WB$$

Co-Variance using Beta	Co-variance of an Asset with itself is its Variance	Correlation between 2 stocks
$\left(COV_{A,B}\right) = \beta_A \times \beta_B \times \sigma^2_M$	$COV_{(A,A)} = \text{Variance}_A = \sigma^2_a$	$r_{AB} = r_{A,\text{Market}} \times r_{B,\text{ Market}}$ (Correlation between A & Market)

Chapter 7 Mutual Fund

1 Net Assets Value (NAV)

$$\text{NAV Per Unit} = \frac{\text{Market Value of Investment (WN 1)} - \text{Outstanding Liabilities (WN 2)}}{\text{Number of units of Mutual Fund}}$$

2 Additional Units (Issued & Redemption)

NAV = MV of all investments (including cash) (+) Receivables (+) Accrued Income (+) (Units Issued x NAV Per Unit) (-) O/s Liabilities / Accrued Expenses (-) (Units redeem x NAV Per Unit) (÷) [Opening Units + Units Subscribed - Units Redeemed] (no. of units o/s in the beginning)	Closing units = Opening Units (+) Units Issued (-) Units Redeemed

3 Calculation of NAV when Daily information is given

Opening NAV (Yesterday NAV/ p.u.) x outstanding units)	**xxx**
(+) Dividend Received	xxx
(+) Interest Received	xxx
(+) Portfolio Appreciation	xxx
(+) Money received on issue of new units	xxx
(-) Expenses Incurred/ CG, Div, Distributed	(xxx)
(-) Money paid on redemption of units	(xxx)
Today's Closing NAV	**xxx**

$$\text{NAV P.u.} = \frac{\text{Today's NAV (Wn. 1)}}{\text{Outstanding No. of Units}}$$

Yesterday's No. of units
(+) Units issued
(-) Units Redeemed

4 Treatment of Cash balance in MF

Cash Balance	(Rs.)
Inflows received by MF (New units issued by MF co. to investors)	xxx
(-) Investment done by MF (outflow)	
	(xxx)
Cash Balance (to be added while calculating NAV)	xxx

5 Calculation of Closing Cash Balance

Opening Cash/Bank A/c	xxx
[(+) Cash Received on Issue of Units (No. of units issued x NAV per unit)	
(-) Relevant initial exp.	
(-) Investment to purchase financial assets]	
Add:-	
Proceeds from sale of securities	xxx
Interest / Dividend Income Received	xxx
Less:-	
Cost of Securities Purchased	(xxx)
Fund Management / Other Expenses Paid	(xxx)
Distribution of Capital Gain on sale of securities	(xxx)
Dividend Distribution from retained earning	(xxx)
Closing Cash Balance to be added in NAV	xxx

6 Return from Mutual Fund to Investors

HPR (Holding Period Return)

$$\frac{\left(NAV_{End} - NAV_{Beg}\right) + \text{Dividend Income} + \text{Capital Gains}}{NAV_{Beg}}$$

APR (Annualised Period return/ Annualised Yield)

$$HPR \times \frac{12 \text{ Months} / 52 \text{ Weeks} / 365 \text{ Days}}{\text{Given : Months / Weeks / Days}}$$

7 Return % (Closed Ended Funds)

$$\frac{\text{Sales price (at stock market price)- Purchase Price + Dividend other income}}{\text{Purchase Price}}$$

8 Calculation of Return in cases of Dividend Reinvestment / Bonus Scheme by giving impact of Security Transaction Tax (STT) & Short Term Capital Gain (STCG).

Redemption Value : Closing Number of Units x Closing NAV per unit	xxx
(-) Security Transaction Tax (STT % of Redemption Value)	(xxx)
= Net Amount Received	xxx
(-) Short Term Capital Gain Tax (STCG)	(xxx)
(Only on units sold within one year of redemption; (no. of units) (x) Selling price per unit (-) Purchase/Reinvested cost per unit) (x) STCG Tax %	
(-) Investment	(xxx)
= Return From Mutual Fund	xxx

9 Expense Ratio

In % (Expense ratio %)	In units (Expense ratio per unit)
$\frac{\text{Management expenses of mutual fund}}{\text{Average value of portoflio}}$	$\frac{\text{Management Expenses / unit}}{\text{Average NAV Per unit}}$
⩔	⩔
$\frac{\text{Op.Value of Portfolio + Cls. Value of Portfolio}}{2}$	$\frac{\text{Op.NAV per unit + Cls. NAV per unit}}{2}$

10 Load in Mutual Funds

Entry Load (Also called as front End Load)	Exit Load (Also called as Back End Load)
Sale Price = NAV (1 + Front End Load %)	Repurchase Price= NAV (1 - Back End Load %)
$NAV = \frac{\text{Sale Price}}{(1 + \text{Front End Load \%})}$	$NAV = \frac{\text{Repurchase Price}}{1 - \text{Back End Load \%}}$
$\text{Front End Load \%} = \frac{\text{Sale Price}}{NAV} - 1$	$\text{Back End Load} = 1 - \frac{\text{Repurchase Price}}{NAV}$

11 Required Return to be earned by Mutual Fund company based on expectations of the Investor

$$\text{Required Return to be earned by Mutual Fund company} = \frac{\text{Expected Return \%}}{(1 - \text{Intial Expenses \%})} + \text{Annual Recurring Expenses \%}$$

12 Dividend Equalisation Reserve

$$\frac{\text{Income earned by M.F. company before new investor has done investment}}{\text{Units before issue of new units (old units)}} \times \text{New no. of units to be issued}$$

13 Dividend Equalisation Amount to be paid when an investor sells his units before dividend date

$$\frac{\text{Income earned by M.F. company before old investor has sold his investment}}{\text{Units before sale of old units}} \times \text{no. of units sold}$$

14 Calculation of Issue price / Repurchase price

	Units	Income Per Unit	Total Income (Rs.)
Income of 1st Month	xx 50 (opening units)	xx 5	xx 250
Add: Dividend equalisation received on issue at above per unit income	xx 10 (units issued)	xx 5	xx 50
Total	xx 60	xx 5	xx 300
Add: Income of 2nd Month	- - 60	xx 2	xx 120
lets suppose we have redemption in this month			
Less: Dividend equalisation paid on repurchase of units at above p.u. income	(xx) 5 (unit repurchased)	(xx) (5 + 2) = 7	(xx) 35
Total	xx 55	xx 7	xx 385
Add: Income of 3rd Month	- - 55	xx 1	xx 55
Total	xx 55	xx 8	xx 440
Less: Dividend Distributed at the end of 3rd Month	- - 55	(xx) (2)	(xx) (110)
Balance	xx 55	xx 6	xx 330

15 Calculation of Issue Price

Particulars	(Rs.)
Opening NAV Per Unit	xxx
Add: Entry Load	xxx
Total	**xxx**
Add: Dividend equalisation amt. (When units issued)	xxx
Issue Price	**xxx**

16 Calculation of Repurchase / Redemption Price

Particulars	(Rs.)
Opening NAV	xxx
Less: Exit Load	(xxx)
Total	**xxx**
Add: Dividend equalisation amount (When units repurchased)	xxx
Redemption Price	**xxx**

17 Calculation of Total NAV in question of Dividend Equalisation Reserve

Opening NAV	xxx
(+) Portfolio Appreciation	xxx
(+) Income of all months	xxx
(+) Dividend Equalisation Reserve Received on issue of units	xxx
(-) Dividend Equalisation Reserve paid on repurchase of units	(xxx)
(-) Dividend Distributed	(xxx)
Closing NAV	**xxx**

18 Tracking Error

$$TE = \sqrt{\frac{\sum\left(d - \bar{d}\right)^2}{n - 1}}$$

Chapter 8 Derivatives

1 Payoff table for Options Holder / Buyer (vice versa for option seller)

Call Option	
Market Price	xxx
(-) Strike / Exercise Price	(xxx)
(-) Premium Paid	(xxx)
Net Gain / Loss	xxx

Put Option	
Exercise Price / Strike	xxx
(-) Market Price	(xxx)
(-) Premium Paid	(xxx)
Net Gain / Loss	xxx

2 Calculate Probability of Upper Price (us) & Down Price (ds)

$$P \text{ (of upper price)} = \frac{(r - d)}{(u - d)}$$

Where, $r = e^{rt}$ or $r = (1 + r)^t$

$\therefore$ Probability of Down Price = (1 - P)

3 Calculate Value of Option

$$\text{Value of Call : } C_0 = \left[\frac{Cu\,(P) + Cd\,(1 - P)}{R}\right]$$

4 Calculate Probability (Probability will be same for both period)

$$P = \frac{(r - d)}{(u - d)}$$

5 Risk Neutral Method

$$\text{Spot Price of share} = \frac{\left(\text{Expected Upper Level share price} \times P\right) + \left(\text{Expected Down Level share price} \times (1 - P)\right)}{R}$$

$R = 1 + r$ or $R = e^{rt}$

6 Black & Scholes Model (BSM)

Value of Call Opton

$$\left[So \times n\,(d1) - \frac{EP}{e^{rt}} \times n\,(d2)\right]$$

$$d1 = \frac{Ln \times \left(\frac{So}{EP}\right) + \left(rf + \frac{\sigma^2}{2}\right) t}{\sigma\sqrt{t}}$$

$$d2 = d1 - \sigma\sqrt{t}$$

7 If there is dividend income in BSM method; then value of call option is

$$\left[So - \frac{Div}{e^{rt}}\right] \times N(d1) - \left[\frac{EP}{e^{rt}} - N(d2)\right]$$

$$d2 = d1 - \sigma\sqrt{t}$$

$$d1 = \frac{\left[Ln\left(\frac{So - Div \times e^{-rt}}{Ep}\right)\right] + \left[\left(Rf + \frac{\sigma^2}{2}\right)t\right]}{\sigma\sqrt{t}}$$

8 Put Call Parity

$$\text{Value of Po} = \frac{EP}{e^{rt}} - So + \text{Value of Co.} \quad \text{or} \quad \text{Value of Po} + So = \frac{EP}{e^{rt}} + \text{Value of Co.}$$

9 Delta △ / Hedge Ratio

$$\text{No. of shares to be bought per option} = \frac{\text{Change in Value / Premium of Option}}{\text{Change in Share Price}} = \frac{cu - cd}{us - ds}$$

10 Gamma γ (Called as Delta of Delta)

$$\gamma\ (\text{Gamma}) = \frac{\text{Delta 1 - Delta 2}}{\text{Price of Stock 1 - Price of Stock 2}}$$

11 Vega

$$= \frac{\text{Difference in Option Value}}{\text{Difference in Standard Deviation}}$$

12 Theta θ (A measure of time delay)

$$\theta\ (\text{Theta}) = \frac{\text{Different in Option Value}}{\text{Different in Time}}$$

13 RHO

$$\text{RHO} = \frac{\text{Difference in Option Value}}{\text{Difference in Interest Rate}}$$

14 Based on time Value of money formulas

Simple interest	Compounding interest	Continuous Compounding
$FV = PV(1+rt)$	Single/ compounding annual : $FV = PV(1+r)^t$ Multiple Compounding: $FV = PV\left(1 + \frac{r}{n}\right)^{t \times n}$	$FV = PV.e^{rt}$

15 Dividend Impact

Calculated on MPS: $DY = \frac{DPS}{MPS}$

16 How to Calculate TFP

Simple interest with dividend	SI with D.Y.	CI with dividend (without TVM)
$S(1 + rt) - D$	$S[1 + (r - d) \times t]$	$S(1 + r)^t - D$

CI with Dividend Yield	CC without Dividend	CC with Dividend
$S \times [1 + (r - d)]^t$	$[S \times e^{rt}]$	$S \times e^{(r - d) \times t}$

17 Formulas to calculate Theoretical Future Price

Basis	No Dividend Income	Dividend Income Absolute	Dividend Yield
Simple Interest	$S(1 + rt)$	$S(1 + rt) - D$	$S\left[1 + (r - d)\,t\right]$
Compounding Interest	$S(1 + r)^t$ (Single Compounding)	$S(1 + r)^t - D$ (Without TVM for Div)	$S\left[1 + (r - d)\right]^t$
	$S\left(1 + \frac{r}{n}\right)^{nt}$ (Multiple Compounding)	$S - \left[\frac{D}{(1 + r)^t}\right] \times (1 + r)^t$ (With TVM for Div)	
Continuous Compounding Interest	$S \times e^{rt}$	$S \times e^{rt} - D$ (Without TVM for Div)	$S \times e^{(r-d)\,t}$
		$\left[S - \frac{D}{e^{rt}}\right] \times e^{rt}$ (With TVM for Div)	

18 Hedging with Stock Futures

$$\text{No. of futures contracts to be taken} = \frac{\text{Value of shares or Value of Portfolio}}{\text{Value of 1 Future Contract}}$$

Value of 1 Future Contract → No. of Shares per lot (x) Future Price

19 Hedging with Index Futures

$$\frac{\text{Value of share /portfolio}}{\text{Price of Future Contracts}} \times \beta_P - \beta_T$$

Price of Future Contracts → Lot size (x) Future Price/ share

20 Hedging with Index Futures

$$\frac{\text{Change in Value of Portfolio of Share}}{\text{Change in Value of Market Portfolio (Index)}}$$

21 Partial Hedge

$$\text{Value of position in Index Future} = \text{Value of existing Portfolio} \times \text{Existing beta} \times \text{percentage (\%) to be Hedge}$$

Chapter 9 Forex

1 How to Convert DQ to IDQ in Dual Quotes

Convert DQ ----------> IDQ

$$IDQ_{(Bid)} = \frac{1}{DQ_{Ask}} \qquad IDQ_{(Ask)} = \frac{1}{DQ_{Bid}}$$

Convert IDQ ----------> IDQ

$$DQ_{(Bid)} = \frac{1}{IDQ_{Ask}} \qquad DQ_{(Ask)} = \frac{1}{IDQ_{Bid}}$$

2 Formula for calculating Premium / Discount

$$\text{Premium / Discount} = \left[\frac{\text{Forward - Spot}}{\text{Spot}} \times \frac{\text{12 Months / 365 Days / 52 Weeks}}{n} \times 100\right]$$

(Always on annualised basis)

3 Cross Rates

Rule 1

$$\text{One Way Quote} = \left[\frac{\$}{Rs.} = \frac{\$}{£} \times \frac{£}{Rs.}\right]$$

Two Way Quote:

$$\text{Bid}\left(\frac{A}{B}\right) = \text{Bid}\left(\frac{A}{C}\right) \times \text{Bid}\left(\frac{C}{B}\right)$$

$$\text{Ask}\left(\frac{A}{B}\right) = \text{Ask}\left(\frac{A}{C}\right) \times \text{Ask}\left(\frac{C}{B}\right)$$

Rule 2

Also a quote may be available as $\left(\frac{A}{B}\right)$ but we would need its $\left(\frac{B}{A}\right)$ Version, and it can be converted as below:

$$\text{Bid}\left(\frac{A}{B}\right) = \frac{1}{\text{Ask}\left(\frac{B}{A}\right)}$$ & Vice Versa

$$\text{i.e. Bid } (Rs./\$) = \frac{1}{\text{Ask } (\$/Rs.)}$$

$$\text{and Ask } (Rs./\$) = \frac{1}{\text{Bid } (\$/Rs.)}$$

4 Forward Rate

As Per iRP

(Foreign/ Base Currency) (Domestic/ Variable Currency)

$$\text{Forward Rate} = \frac{\text{Spot Rate} \times [1 + \text{Interest Rate}]}{[1 + \text{Interest Rate}]}$$

(Foreign/ Base Currency) (Foreign / Base Currency)

5 Annualized Forward Margin (AFM)

$$= \frac{\text{Forward Rate - Spot Rate}}{\text{Spot Rate}} \times 100 \times \frac{12}{N}$$

6 Formula for calculating Premium / Discount

$$\text{Premium / Discount} = \left[\frac{\text{Forward - Spot}}{\text{Spot}} \times \frac{\text{12 Months / 365 Days / 52 Weeks}}{n} \times 100\right]$$

(Always on annualised basis)

If Positive (+) : Forward Premium If Negative (-) : Forward Discount

n = Number of Months / Days / Weeks

7 Money Market Hedge

Example 1 - Money Market Hedge (MMH) (Indian Exporter)

Foreign currency to be received in future i.e. You are an Indian exporter. You are going to received $1000 after 1 year. Today's spot = 1$ = Rs. 50

Interest rate : USA = 5% ($), India = 10% (Rs.)

Frame a MMH for our client

Invest in Rs	Borrow in $
Convert using spot rate	Amount to be borrowed
Rs. 47,619 ($ 952.381 x 50/$)	$ 952.381
invest (India @ 10%)	After 1 year, $ = 5%
Rs. 52,381	$ 1000

$$FV = PV (1 + r)^n$$

$$\$1000 = PV (1 + 0.05)^n$$

Therefore, PV = 1000 / 1.05

PV = $ 952.381

Amount to be borrowed

Step 1	Borrow in Foreign Currency: Amount of borrowing should be such that Amount Borrowed + Interest on it becomes equal to the amount to be received.
Step 2	Convert the borrowed foreign currency into home currency by using spot Rate.
Step 3	Invest this home currency amount for the required period.
Step 4	Pay the borrowed amount of foreign currency with interest using the amount to be received in foreign currency. [May be Ignored]

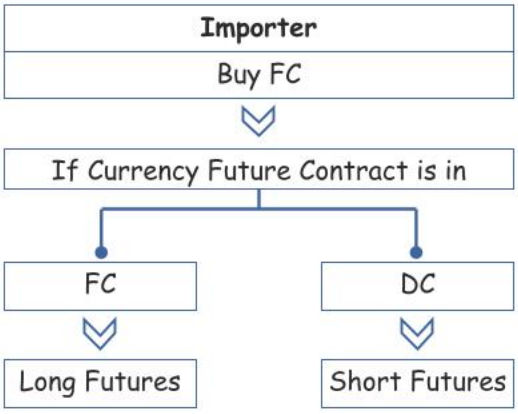
8 Types of Foreign Bank Accounts : Nostro, Vostro, Loro A/c's

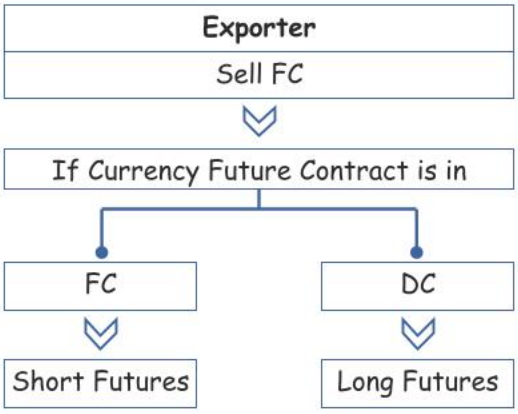
Nostro A/c	Vostro A/c	Loro A/c
It means "Our Account with You"	It means "Your Account with Us."	It means "Their Account with You"
It is an account of Domestic bank with Foreign Bank for Foreign Currency.	It is an account of Foreign Bank with Domestic Bank for Domestic Currency.	It is an account of one bank (Third Party domestic bank) with another bank Domestic bank with Nostro A/c on behalf of other bank. Foreign Bank also called as Third Party Account.
HDFC, Delhi has an A/c with Bank of Japan, Tokyo for Japanese yen.	Eg: Standard Chartered Bank, London has an account with Union Bank of India, Mumbai for Indian Rupees.	Eg: SBI Mumbai has Nostro Account with CITI Bank, New York but referred used by Saraswat Bank, Hyderabad.

9 Currency Futures

- Used as hedge to safeguard against currency movements.
- The most important thing in futures contract is whether to Long (Buy) or Short (Sell).
- Below is the table to identify that:

FC = Foreign Currency	DC = Domestic Currency

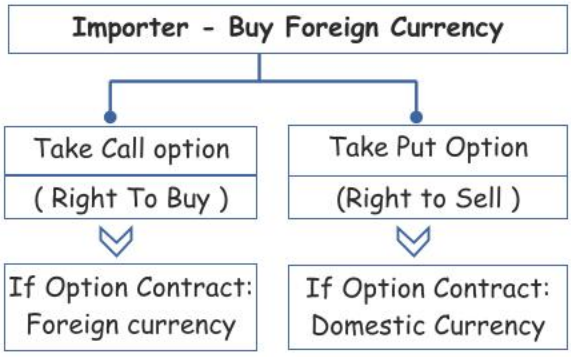


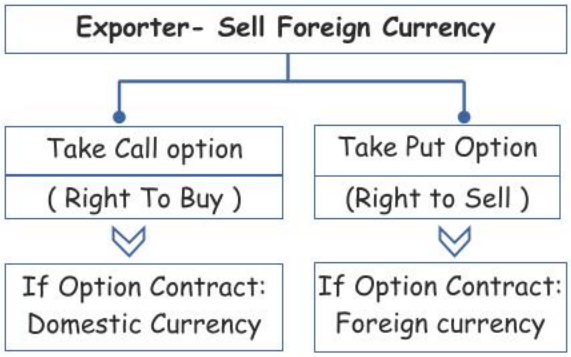


10 Currency Option

Currency Options is a contract that will give the buyer the right, but not the responsibility, to buy or sell a specific currency at a predetermined exchange rate on or before a set date.

Call Option = Right to Buy	Put Option = Right to Sell





Chapter 10 IFM

1 Evaluate International Projects on the basis of NPV (Net Present Value)

PV of Cash Inflow	
Selling Price per Unit	
(-) Variable cost per unit	
Contribution per unit	
(x) No. of Units	
Total Contribution	
(-) Fixed Cost	
EBITD	
(-) Depreciation	
EBIT	
(-) Tax	
NOPAT	
(+) Depreciation	
Net Cashflow	

PV of Cash Outflow
Investment in the Project
Equity Share Capital
(+) Debenture
(+) Loan
(+) PSC

2 IRR Techniques (Internal Rate of Return)

$$\text{IRR} = \text{Lower Rate} + \frac{\text{Lower Rate NPV}}{\text{Lower Rate NPV - Higher Rate NPV}} \times \text{Difference in Rate (HR - LR)}$$

3 Interpolate

IRR is solved using trial & error method by applying interpolation.

$$\text{IRR} = \text{Lower Rate} + \frac{\text{Change in NPV Required} \times \text{(HR - LR)}}{\text{Total change of NPV from higher to lower rate}}$$

4 Concept of MIRR (Modified Internal Rate of Return)

$$r = \sqrt[t]{\frac{\text{Terminal Cashflow}}{\text{Initial Outlay}}} - 1$$

5 Purchasing Power Parity Theory

$$\text{Forward Rate} = \text{Spot} \times \frac{(1 + \text{Inflation})_{VC/HC}}{(1 + \text{Inflation})_{BC\ FC}}$$

6 Raising of Funds through GDR's

Given: First we should know the gross money required through GDR's

Step 1

Gross Receipt	: 100
(-) Issue Expenses	: 4
Net Receipt	: 96

Step 2: Calculation Value of Each GDR

1 GDR = No. of Shares (x) MPS (x) (1 - Discount %)

∴ We get Value of **1 GDR**

∴ The above GDR (in Rs.) is converted into GDR (in $) using conversion rate.

Step 3

No. of GDR's to be issued =

$$= \frac{\text{Gross Value (in \$)}}{\text{Value of 1 GDR (in \$)}}$$

(Through Step 2)

Step 4: Now calculate cost of GDR : $K_e = \frac{D_1}{P_o} + g$

Where, D_1 = Expected Dividend = Dividend per share (x) No. of shares/ GDR

G = given

P_0 = Value of 1 GDR (in Rs.) - Issue Expenses %

Chapter 11 IRRM

1 FRA for a Speculator (will go for Net Settlement)

Long / Buy / Borrow FRA	
Actual Interest Rate $\gg$ Forward Interest Rate	Actual Interest Rate $\ll$ Forward Interest Rate
Gain to Customer	Loss to Customer
Actual Interest Rate (-) Forward Interest Rate (x) Principal Amount	Forward Interest Rate (-) Actual Interest Rate (x) Principal Amount

Short / Sell / Invest FRA	
Actual Interest Rate $\gg$ Forward Interest Rate	Actual Interest Rate $\ll$ Forward Interest Rate
Loss to Customer	Gain to Customer
Actual Interest Rate (-) Forward Interest Rate (x) Principal Amount	Forward Interest Rate (-) Actual Interest Rate (x) Principal Amount

2 Final Settlement by Speculator

$$\text{Payment} = \frac{(N)\ (RR - FR)\left(\frac{dtm}{Dy}\right)}{\left[1 + RR + \left(\frac{dtm}{Dy}\right)\right]} \times 100$$

3 Example to Calculate Theoretical FRA (Data in YEARS)

$$\left(1 + \underset{\text{(Given)}}{\text{12 Month Int. Rate}} \times \frac{12}{12}\right) = \left(1 + \underset{\text{(Given)}}{\text{6 Month Int. Rate}} \times \frac{6}{12}\right) \times \left(1 + \text{6 Month Int. Rate} \times \frac{6}{12}\right)$$

Calculation of Premium Payable on Options

$$P = \frac{rp}{PVAF\ (i\ \%\ ,\ t)} \times A \qquad \text{OR} \qquad P = \frac{rp}{\left[(1 \div i) - \frac{1}{i \times (1+i)^t}\right]}$$

4 I. Interest rate call option: (CAP)

Used by a Borrower having floating Rate liability outstanding and is at the Risk of upward rise in Int. rates. CAP (max ceiling) – Interest rates are capped at a certain ceiling

Cap Option Buyer	Cap Option Seller
(Expecting Interest rates to go up)	(Expecting Interest Rates to go down)
Gain: Act. Int rate > Ex. Price Int. rate (Gain = AIR - EIR)	Gain : Act. Int rate < Ex. Price Int. rate Gain = Premium amount
If Act Int Rate < Ex. Price Int. rate Then No exercise of option. Loss: Premium amount	When Act Int Rate > Ex. Price Int. rate Then option buyer will exercise Loss to the extent of (AIR - EIR)

5 II. Interest Rate Put Option (Floor)

(Used when expectation of Interest rate to go down)
Interest Rate is Floored at certain ceiling.

Floor	Option Buyer	Option Seller
Gain	Actual Interest Rate < EP Interest Rate (EPIR - AIR)	Actual Interest Rate > EP Interest Rate Max to the extent of Premium
Loss	To the extent of premium	To the extent of (EPIR - AIR)

6 III. Interest Rate Collar Option

Option 1	Option 2
Expectation of increase in interest rate	Expectation of decrease in interest rate
Buy cap option & sell floor option	Sell cap option & Buy floor option

Chapter 12 Corporate Valuation

1 Net Assets Valuation Method

$$\text{Net Assts Value Per Share} = \frac{\text{Total Assets (WN 1) - Total Outside Liabilities (WN 2)}}{\text{Total Number of Equity Shares}}$$

2 P/E Ratio or Earning Yield Multiplier

MPS = P/E Ratio x EPS

P/E Ratio	EPS
$\text{P/E Ratio} = \frac{\text{MPS}}{\text{EPS}}$	$\text{EPS} = \frac{\text{NPAT - Preference Dividend}}{\text{No. of Equity Shares}}$

Earning Yield Multiplier	Adjusted P/E Ratio x Adjusted EPS

3 Business Capitalisation Model / Future Maintainable Profit

$$\text{Value of Firm/ Business} = \frac{\text{Expected Annual Maintainable Profit} \quad \text{WN. 1}}{\text{Capitalisation Rate}\,(K_0) \quad \text{OR} \quad \text{Required Earning Yield} \quad \text{WN. 2}}$$

(Capitalized Earning Value)

4 Expected Annual Maintainable Profit (Also called as FMP)

Average of Past Years Profit Before Tax	xxx
Add: Profit likely to arise in future	xxx
: Actual expenses & losses not likely to occur in future	xxx
: Extra- ordinary expenses / losses	xxx
	xxx
Less: Profit not likely to arise in future	(xxx)
: Actual expenses & losses likely to occur in future (Eg: Additional advertisement exp.)	(xxx)
: Extra Ordinary Income (Eg: Gain on sale of assets in past) (Eg: Income from non-trade investment)	(xxx)
FMP Before Tax	xxx
Less: Tax (Based on Future Expectation)	(xxx)
FMP After Tax	xxx

5 Capitalization Rate (Basied on)

Required Earning Yield		Reciprocal of P/E Ratio		WACC
				K_0 (Cost of Equity, Preference, Debt)
$\frac{\text{EPS}}{\text{Share Price}}$	OR	$\frac{1}{\text{P/E Ratio}}$	OR	$Wt_{Equity} \times K_e + Wt_{Debt} \times K_{d\,(1-t)} + Wt_{Pref} \times K_P$

6 Concept of Price of Equity Share on Fair Value Basis

$$= \frac{\text{Value per Equity Share as per Net Assets Value Method} + \text{Value Per Equity Share as per FMP Method}}{2}$$

7 Economic Value Added

EVA = [NOPAT - (Invested Capital x WACC) **OR** EVA = [NOPAT - Capital charge]

Working Note 1 - Calculation of NOPAT:

EBIT
(+) Non Operating Expenses (Losses on sale of plant)
(-) Non Operating Income (Income on Sale of plant / Income from non trade investment)
Adjusted EBIT
(-) Tax
(+) Non Cash expenses (eg: like provision for bad debts & doubtful debts)
(Do not add Depreciation)
NOPAT (Net Operating profit after tax)

WACC

Calculation of NOPAT:

NOPAT means operating profit after tax. It can be calculated in following different ways-
NOPAT = EBIT - (Tax Rate x EBIT)

Calculation of WACC (Weighted average cost of capital)

Schedule of Fund	Amount	% of Source (1)	Cost of Capital (2)	WACC (1 x 2)
ESH			Ke	
R.S.			Ke	
Deb			Kd (post tax)	
PSH			Kp	
			Total	

8 Different Ways to Calculate EBIT

$$\text{EVA Dividend} = \frac{\text{EVA}}{\text{No. of Outstanding Equity Share}}$$

$$\text{EBIT} = \frac{\text{PAT}}{(1 - \text{Tax Rate})} + \text{Interest}$$

$$\text{EBIT} = \frac{\text{Earning for Equity} + \text{Preference Dividend}}{(1 - \text{Tax Rate})} + \text{Interest}$$

$$\text{EBIT} = \text{EBT} + \text{Interest}$$

If Financial Leverage is given; $\text{Financial Leverage} = \frac{\text{EBIT}}{\text{EBT}}$ OR $\frac{\text{EBIT}}{\text{EBIT - Interest}}$

9 Shareholders Value Analysis

An addition to EVA by also incorporating future cash flows

Step 1: Calculating Operating cash flows

EBIT (Add estimated growth for future years)	
(-) Interest	
EBT	
(-) Taxes	
EAT	
(+) Depreciation	
(+) Non Cash Expenses (one time write off)	
Operating Cash Flow	

Step 2: Calculation of Free Cash Flow

Operating Cash Flow	
(-) Incremental capital investment (forecasted)	
(-) Forecasted increase in net working capital	
Free Cash Flow (FCF's)	

Step 3: Calculation of Present Value

Free Cash Flow (Step 2) are discounted at WACC to bring it at present cash flow

$$\frac{FCF_1}{DF_1} + \frac{FCF_2}{DF_2} + \frac{FCF_N}{DF_N}$$

Step 4: Terminal Value

Add terminal value to above PV's to get all the years present values

$$\frac{TV}{K_e - g} \times \text{PV of Last FCF}$$

Step 5: Value of Equity

Total of All PV's (as per Step 4)	xxx
(+) Market value of non core assets and marketable investment	xxx
(-) Carrying cost of debt	(xxx)
= Value of Equity	xxx

10 MVA (Market Value Added)

a) From Company's Point of View

$$MVA = \frac{EVA_1}{(1+K_0)^1} + \frac{EVA_2}{(1+K_0)^2} + \frac{EVA_n}{(1+K_0)^n} + \frac{EVA_n\ (1+g)}{K_0 - g} \times \frac{1}{(1+K_0)^n}$$

Value of Business = Total Capital Employed + MVA
(as calculated in EVA) (as calculated above)

b) From Equity Shareholders Point of view

MVA = Value of Equity as per Market - Value of Equity as per BOA (Book of Accounts)

(MPS x No. of Equity Share) - (Equity shareholders Fund)

Market Capitalisation

ESC + R & S - P/L (Dr. Balance) - Preliminary Exp - Miscellaneous Exp

11 Project Beta

2 Scenarios are possible and below is its treatment

Scenario A

Step 1

Formula to Calculate assets beta:

$$\beta_A = \beta_E \left(\frac{E}{E + D\ (1-t)}\right) + \beta_D \times \left(\frac{D\ (1-t)}{E + D\ (1-t)}\right)$$

(Note: Use Debt/ Equity Value of **Listed (Proxy)** company)

Step 2

Use formula again:

$$\beta_A = \beta_E \left(\frac{E}{E + D\ (1-t)}\right) + \beta_D \times \left(\frac{D\ (1-t)}{E + D\ (1-t)}\right)$$

(Note: Use Debt/ Equity Value of **Unlisted** company)

Scenario B

$Wt_{Business\ 1} \times \beta_{A\ Business\ 1} + Wt_{Business\ 2} \times \beta_{A\ Business\ 2}$

Now use below formula to calculate β_E

$$\beta_A = \beta_E \left(\frac{E}{E + D(1 - t)}\right) + \beta_D \times \left(\frac{D(1 - t)}{E + D(1 - t)}\right)$$

- From above formula
- Balancing Figure
- Input the data as it will be given
- Assumed to be zero, in absence of information. If β_D is given use & solve it

We can now use the above β Equity to calculate.
Cost of capital (Equity) using CAPM formula i.e. [Rf + β (Rm - Rf)]

Finally WACC can be calculated as; $W_{Equity} \times COC_{Equity} + W_{Debt} \times Cost\ to\ Debt_{(1 - Tax)}$

12 Valuation Based on Multiples

P/E Multiple Approach MPS = EPS × P/E Ratio	**Enterprise Value:** Market Value of Equity Share + Market value of preferred Equity + Market value of Debt + Minority Interest - Cash & Cash equivalents & Equity Investments, Investment in any co.
$\text{Enterprise Value to Sales} = \frac{EV}{Sales}$ ↙ Corporates like IT & Technological Firm use this multiple	
$\text{Enterprise Value to EBITDA} = \frac{EV}{EBITDA}$ ↙ Represent amount available to debt & equity holders of a company	EBITDA = EBIT + depreciation + amortization

13 FCFF(Free Cashflow to the Firm)

(4 Ways to Calculate FCFF)

A. FCFF when Net Income / PAT is given

FCFF = Net Income / PAT
- (+) Interest (1 - t)
- (+) Depreciation
- (+) Other Non Cash Item
- (-) Capex
- (-) Changes in Net working Capital

Net Income / PAT
→ Revenue
(-) Operating Expenses (Including Dep'n + Non Cash)
= EBiT
(-) Interest
= EBT
(-) Tax
= EAT / Net Income

B. FCFF when Operating Profit (EBiT) is given

EBiT (1 - t) can be written as PAT + Interest (1 - t)
Substituting EBiT (1 - t) = PAT + Interest (1 - t)

In above Formula:

FCFF = EBiT (1 - t)
- (+) Depreciation
- (+) Other Non Cash Item
- (-) Capex
- (-) Change in Net working Capital

C. FCFF when Net Capex is given

FCFF = PAT
- (+) Interest (1 - t)
- (+) Non Cash Item
- (-) △ in Net working Capital
- (-) Net Capex

D. FCFF when cashflow from operation is given

FCFF = PAT
- (+) Depreciation
- (+) Non Cash Item
- (-) Change in working Capital (Cash flow from operations)
- (+) Interest (1 - t)
- (+) Changes in FCi

OR

FCFF = CFO
- (+) Interest (1 - t)
- (-) Fci (Fixed Capital Investment

Note for all above Methods:
Always consider " Core operating business income & expense" for all above formulas.

E. Based on FCFE (Free cashflow to Equity)

FCFF = FCFE
- (+) Interest (1 - t)
- (+) Principal Prepaid
- (-) New Debt Issued
- (+) Preference Dividend (Capex - Depreciation)

Note : Capex =
Purchase of fixed assets in current year
(-) Sale of Fixed assets in current year.

Net Working Capital
= Working Capital of Current Year (Current Assets - Current Liabilities)
(-) Working capital of Previous Year

F. FCFF based on EBITDA

(Earnings before interest, Tax, Depreciation, & Amortisation)

FCFF = EBITDA x (1 - Tax) + (Depreciation x Tax Rate) - Capex - Change in Net working Capital

14 Free cashflow to Equity

(Used for measuring the intrinsic Value of the stock for equity shareholders)

Option 1	Option 2
FCFE = Net Profit (+) Depreciation (-) Change in Net working Capital (-) Capex (Equity Share Portion) (+) New Debt (-) Debt Repayment (+) Net issue preference shares (-) Preference share dividends	FCFE = PAT (+) Non Cash Expenses (-) (△ in Working Capital investment x Equity Ratio) (-) △ Net Capex x Equity Ratio) Debt Ratio + Equity Ratio = 1 i.e. Debt Ratio = 1 - Equity Ratio Equity Ratio = 1 - Debt Ratio

	FCFF	FCFE
1. Valuation - Single Stage	$V\ Firm = \frac{FCFFo \times (1+g)}{WACC - g}$ (WACC = K_O)	$V_E = \frac{FCFE \times (1+g)}{Ke - g}$
1. Valuation - Multi-Stage	$V\ Firm = \sum \frac{FCFF_0 \times (1+gn)^t}{(1+Ke)^t} + \frac{FCFF_t (1+gn)}{(WACC - gn)(1+WACC)^t}$	$V\ Equity = \sum \frac{FCFE \times (1+gn)^t}{(1+Ke)^t} + \frac{FCFE_t \times (1+gn)}{(Ke - gn) \times (1+Ke)^t}$
	Here; g = b x ROCE Where, b = retention ration	Here; g = b x ROCE
2.	V firm = Vd + VE + Vp - Cash (Value of debt + Value of Equity + Value fo Preference share) ∴ VE = V firm - Vd - Vp + Cash	**Per Share** $\frac{\text{Value Equity}}{\text{No. of shares}} = P_0$

Chapter 13 Merger

1 General Formulas to be Used

Market Capitalisation

MPS x No. of Equity Shares

MPS

MPS = P/E Ratio x EPS

P/E Ratio

$$\text{P/E Ratio} = \frac{\text{MPS}}{\text{EPS}}$$

EPS

$$\text{EPS} = \frac{\text{NPAT}}{\text{No. of Equity Shares}}$$

MPS

$$\text{P/E Ratio} \times \frac{\text{NPAT}}{\text{No. of Equity Shares}}$$

Market Capitalisation

= MPS x No. of Equity Shares

Market Cap

= P/E Ratio x NPAT

∴ Market Capitalisation

$$\text{P/E Ratio} \times \left(\frac{\text{NPAT}}{\cancel{\text{No. of Equity Shares}}} \right) \times \cancel{\text{No. of Equity Share}}$$

2 Calculate the EPS (Post Merger)

Once the earning are calculated; now calculate the EPS (post merger).

$$\text{New EPS (After Merger)} = \frac{\text{Earning after tax before Merger (Acquirer)} + \text{Earning after tax before Merger (Target)} + \text{Merger/ Synergy Gains (if any)}}{\text{Old Shares of Acquirer + New Shares of Target}}$$

EPS after Merger or EPS of a Merged Firm

$$\text{EPS}_{A+T} = \left[\frac{\text{EAT}_A + \text{EAT}_T + \text{Synergy Gain}}{\text{No. of Share}_A + (\text{No. of Share}_T \times \text{Swap Ratio})} \right]$$

3 Target Company wants to Keep Same EPS/MPS Post Merger

Target Co. needs same EPS as before merger

$$\text{Swap Ratio} = \frac{\text{EPS/MPS of Target (Pre-merger)}}{\text{EPS/MPS of Acquirer (Pre-merger)}} \times \text{Share of Target co. Before Merger}$$

4 Acquirer Company wants to Keep Same EPS/MPS Post Merger

Pre Merger PAT of Acquirer	xxx
(+) Pre Merger PAT of Target	xxx
(+) Synergy	xxx
= Post Merger PAT	xxx
(÷) Pre Merger of EPS of Acquirer co.	xxx
= Maximum no. of shares of Acquirer after merger	xxx
(-) Existing no. of shares of Acquirer	(xxx)
= Maximum number of shares to be issued to target co.	**xxx**

Pre Merger Market Cap of Acquirer	xxx
(+) Pre Merger Market Cap of Target	xxx
(+) Synergy	xxx
= Post Merger Market Cap	xxx
(÷) Pre Merger of MPS of Acquirer co.	xxx
= Maximum no. of shares of Acquirer after merger	xxx
(-) Existing no. of shares of Acquirer	(xxx)
= Maximum number of shares to be issued to target co.	**xxx**

5 Gains from Merger & Synergy

G-1. Total Gain / Loss from Merger

Post Merger Market Value of Merged Firm	= [MPS after Merger x No. of Shares after Merger] (No. of shares of acquirer (+) No. of shares issued to target)	xxx
	Less: Pre Merger market capitalisation of both companies	(xxx)
	Total Gain / Loss from Merger	**xxx**

G-2. Gain or Loss based on Market Capitalisation

	Acquirer Company		Target Company	
Post Merger Market Capitalisation (A)	No. of shares of Acquirer Before Merger (x) Post Merger MPS	xxx	No. of shares issued to target co. by acquirer co. (x) Post Merger MPS	xxx
Less: Pre Merger Market Capitalisation (B)	No. of shares of Acquirer Before Merger (x) Post Merger MPS	(xxx)	No. of shares issued to target co. by acquirer co. (x) Post Merger MPS	(xxx)
Gain/ Loss to Shareholders	(A - B)	**xxx**	(A - B)	**xxx**

G-3. Gain / Loss from merger independently to both companies (Per Share Basis)

	Acquirer Company	Target Company
Post Merger MPS	xxx	—
Equivalent Post Merger MPS	—	xxx Post Merger MPS (x) Swap Ratio
Less: Pre Merger MPS	(xxx)	(xxx)
Gain/ Loss from merger	**xxx**	**xxx**

6 True Cost of Merger

True cost of Merger = Value of Target after merger - Value of Target before merger

(Total Market value of Acquirer co. after merger (x) Shareholding % of Target co. in Acquirer Co.)

(Market Cap of A (Before) + Market Cap of T (Before) + Synergy)

7 Calculation of EPS A+T & MPS A+T in case of Cash Takeover

1. EPS A+T in case of cash take-over & cash is paid out of borrowed money

$$EPS_{A+T} = \frac{E_A + E_T + \text{Synergy Gain} - [\text{Amount Borrowed} \times \text{Interest Rate} \times (1 - \text{tax})]}{\text{No. of Shares of Acquirer}}$$

2. EPS A+T in case of cash take-over & money is arranged from Business itself

$$EPS_{A+T} = \frac{E_A + E_T + \text{Synergy Gain} - (\text{Cash Paid} \times \text{Opportunity cost of Interest})}{\text{No. of Shares of Acquirer}}$$

8 Concept of Promoters holding & Free Float Market Capital

Concept of Promoters holding and free float market capital =

= Total no. of shares held by Promoters (Promoter's Holding)
(+) No. of shares held by minority / outside shareholders.

= Total No. of Shares

Promoters holding in a company (%)

$$\frac{\text{No. of shares of Promoters}}{\text{Total no. of shares in a company}} \times 100$$

Minority / Outsiders holding in a company (%)

$$\frac{\text{No. of shares held by minority of co.}}{\text{Total no. of shares in a company}} \times 100$$

Promoters holding in the merged company (After Merger) =

$$= \frac{\text{Shares of promoters of acquirer co.} + \text{Shares issued to promoters of Target co.}}{\text{Total shares of acquirer co.} + \text{Total shares issued to target co.}} \times 100$$

9 Free Float Market Capitalisation

Market Capitalisation for outside/ minority shareholders in company =
= MPS x No. of Shares of Outsiders/ Minority
(Total no. of equity shares - Promoters holding/ management holdings)

Calculation of % Holding in New Company

$$\text{For A Ltd} = \frac{\text{Total No. of Shares of A Ltd.}}{\text{Total No. of Shares A Ltd} + \text{Total No. of Shares issued to B Ltd.}}$$

$$\text{For B Ltd} = \frac{\text{Total No. of Shares of B Ltd.}}{\text{Total No. of Shares B Ltd} + \text{Total No. of Shares issued to B Ltd.}}$$

10 Merger of a Bank

Special Situation = Merger of a Bank

$$\text{CAR} = \frac{\text{Total Capital}}{\text{Risk Weighted Assets}} \times 100$$

(Total Capital = Equity Share Capital
+ Reserve & Surplus
- Preliminary Expenses)

$$\text{Gross NPA Ratio} = \frac{\text{Gross NPA}}{\text{Gross Advances}} \times 100$$

Note: If exchange ratio is based on NPA Then;

$$\text{Swap Ratio} = \frac{\text{NPA of Acquiring Co.}}{\text{NPAof Target Co.}}$$

11 Purchase Consideration (PC)

PC = Net Payment made by Acquiring company to Target company

Calculation of PC	
Market Value of Equity Shares Issued by A Ltd. to T Ltd.	xxx
(+) Debentures, Preference share Capital Issued by A Ltd. to T Ltd.	xxx
(+) Current Liability Settled / Takeover	xxx
(-) Cash in hand or Bank	(xxx)
(-) Realization of Debtors, Inventories	(xxx)
Purchase Consideration	xxx

Decision Making in above cases is based on NPV:

= PV of Cash inflow (Recurring Cash flows from Target company business in future)
(+) PV of Demerger / Sales of Target company in future
(-) Cash flow (i.e. purchase consideration)

12 Component of MPS

MPS

$$EPS = \frac{\text{Earnings available for ESH's}}{\text{Total No. of Equity Shares}}$$

$$P/E\ Ratio = \frac{MPS}{EPS}$$

BVPS: $\frac{\text{Equity Shareholder's Fund}}{\text{Total No. of Equity Shares}}$

ROE: $\frac{\text{Earning After Tax}}{\text{Equity Shareholders Fund}}$

ESHF:
= Total Assets
(-) Debt
(-) External Liabilities
OR
(ESC + R & S)

$$\text{Retention Ratio} = 1 - \text{Dividend Payout Ratio}$$

$$\text{Growth Rate} = ROE \times \text{Retention Ratio}$$

Calculation of Justifiable Equity Share Exchange Ratio

$$= \frac{\text{Equity Shareholder's Fund}}{\text{Total No. of Equity Shares}}$$

Intrinsic Value Based

$$\text{Market Price Based} = \frac{\text{MPS Target}}{\text{MPS Acquirer}}$$ (Lower Limit)

13 CALCULATION OF SWAP RATIO BASED ON WEIGHTS

Book Value	EPS	MPS
$\frac{BVPS_{(Target)}}{BVPS_{(Acquirer)}} \times Wt_{(Book\ Value)}$	$\frac{EPS_{(Target)}}{EPS_{(Acquirer)}} \times Wt_{(EPS)}$	$\frac{MPS_{(Target)}}{MPS_{(Acquirer)}} \times Wt_{(MPS)}$

14 Impact of Merger on EPS of both companies

Acquirer Company	
Post Merger EPS (EAT(A + T) + Synergy No. of Equity Share (Acquired + Issued to target)	xxx
(-) Pre Merger EPS	(xxx)
Gain / Loss	**xxx**

Target Company	
Equivalent EPS of Target Co. i.e. (EPS of merged Entity (x) Swap ratio)	xxx
(-) Pre Merger EPS	(xxx)
Gain/ Loss	**xxx**

Chapter 13 Advanced Capital Budgeting

1 Sensitivity Analysis

Calculate - Current NPV

⩔

Change in any one factor (SP, VC, FC, DF, Project Life)
(Other factors remaining same)

⩔

The above change in one factor will impact the NPV. Therefore, the overall impact on NPV by change of 1 factor is called **Sensitivity**.

2 Sensitivity

1st Method	2nd Method	3rd Method
If change in factor % is given	Make NPV Zero	ICAI assumes 10% deviation.

- Equation Method
- Formula Method

2.1 Equation Method

Step 1: Calculate current NPV

Step 2: Let the factor to be changed to be (x) such that NPV = 0

PV of Ci
(-) Co

PV of Ci =

$(SP - VC)_1 \times Df_1 + (X - VC_2) \times Df_2$
(-) PV of CO
NPV should be = 0

Let Selling price per unit be x,
Therefore;
(X - VC1) x 0.909 + (X - VC2) x 0.851
(-) 10,000 = 0

2.2 Formula Method

If NPV is to be made Zero; using Formula Method.

General Formula =

$$\frac{\text{Original NPV}}{\text{PV Factor}}$$

$$\text{Change in SP} = \frac{\text{Original NPV}}{\text{PV of Sales}}$$

$$\text{Change in Unit Cost} = \frac{\text{Original NPV}}{\text{PV of Total unit cost (Total Variable Cost)}}$$

$$\text{Change in Sales Volume} = \frac{\text{NPV}}{\text{PV of Ci + PV of FC (Fixed Cost)}}$$

3 Decision Tree

Paths

PV of Cash Inflow$_1$ (1st Scenario) **(+)** PV of Cash Inflow$_2$ (2nd Scenario) = **Net PV of Ci** (-) Cash Outflow = **NPV** (x) Joint Probability = **Expected NPV**	**Working Note:** Probability 1 (1st Scenario) (x) Probability 2 (2nd Scenario) = **Joint Probability**

4 Formulas

1 NPV

Selling Price	EBDT
(-) Variable Cost	(-) Tax
Contribution	Earning Before Tax
(-) Fixed Cost	(+) Tax Saving on Depreciation
EBDT	Cash Inflow
(-) Depreciation	
Earning Before Tax	
(-) Taxes	
Earning After Tax	
(+) Depreciation	
Cash Inflow	

2 Real & Nominal

Real Cashflow (Without Inflation)	**Nominal Cashflow** (With Inflation)
Use Real DF	Use Nominal DF
Nominal Cashflow / (1 + Inflation Rate)	Real Cashflow (x) (1 + Inflation Rate)

$$\left(\frac{1+\text{Nominal DF}}{}\right) = \left(\frac{1+\text{Real DF}}{}\right) + \left(\frac{1+\text{Inflation Rate}}{}\right)$$

$$\text{Nominal DF} = \left[\left(\frac{1+\text{Real DF}}{}\right) + \left(\frac{1+\text{Inflation Rate}}{}\right) - 1\right]$$

3 Probability

Expected NPV = [PV of Expected Cash Inflow - Initial Investment]
(WN 2) + (WN 1)

Working Note 1	Expected Cash Inflow = (Net Cash Inflow x Probability)

Working Note 2	PV of Expected Cash Inflow = $\frac{\text{Expected Cashflow}}{(1+K_e)^n}$	Where, Ke = Discounting Factor

4 Variance (σ^2)

$$\sum\left[\left(X - \overline{X}\right)^2 \times \text{Probability}\right]$$

$$\sum\left[\left(\text{Given Cashflows} - \text{Expected Cashflows}\right)^2 \times \text{Probability}\right]$$

5 Standard Deviation (σ)

$$\sqrt{\text{Variance}}$$

6 Coefficient of Variance

$$\frac{\text{Risk}}{\text{Return}} = \frac{\text{Standard Deviation}}{\text{Exepected Cashflow / Expected PV}}$$

7 RADR (Risk Adjusted Discount Rate)

Rf + Risk Premium

8 Certainty equivalent Approach

Cash Flow x $\propto$ (Certainty Factor)

9 Hillers Model

Variance ka Present Value

$$\frac{(Sd_1)^2}{(1+df)^{1\times 2}} + \frac{(Sd_2)^2}{(1+df)^{2\times 2}} + \frac{(Sd_3)^2}{(1+df)^{3\times 2}}$$

Sd ka Present Value

$$\sqrt{\frac{Var_1}{(1+df)^{1\times 2}} + \frac{Var_2}{(1+df)^{2\times 2}} + \frac{Var_3}{(1+df)^{3\times 2}}}$$